**Climate Change and Water Resource Degradation: Understanding Relationships**

Climate change significantly degrades global water resources by altering their hydrological characteristics. The greenhouse gas (GHG) effect intensifies extreme weather events like flooding and drought, driven by excessive precipitation and rising temperatures. These events degrade water quality and quantity in reservoirs. Prolonged droughts reduce streamflow, lower groundwater levels, and increase surface water pollution. For example, the Colorado River's streamflow has decreased by 19% since 2000, and Lake Kasumigaura in Japan has experienced warming of 1.8˚C to 3.2˚C, accompanied by increased ammonia ($NH_3$) and phosphate ( $PO_4^{3-}$ ) fluxes. Rising temperatures exceeding the critical 1.5˚C threshold amplify water stress, leading to food insecurity, heat stress, water conflicts, and habitat destruction. Conversely, heavy rainfall increases runoff, sedimentation, and the deposition of pathogens and nutrients like phosphorus into aquatic ecosystems. For instance, Lake Victoria's water levels rose by 1.21 m in 2020, causing flooding, while the Odaw River experienced sewage-contaminated flooding, leading to microbiological contamination. Thermal stratification in Lake Tanganyika has further reduced oxygen levels. Flooding and drought also transform carbon sinks, such as wetlands, into sources of carbon dioxide ($CO_2$) and methane ($CH_4$), intensifying global warming by enhancing organic matter decomposition and destroying carbon stores like vegetation. These changes disrupt the water cycle, reducing access to clean water, impairing groundwater recharge, and threatening aquatic ecosystems. This review investigates the relationship between extreme weather events, such as droughts, wildfires, and flooding, driven by climate change, and their effects on hydrological processes in the atmosphere. We also examine changes in the water cycle, including alterations in evapotranspiration, runoff, infiltration, and precipitation. These changes directly affect water resources by restricting access to safe and clean water, disrupting groundwater recharge, and degrading daily living standards. Mitigating these impacts requires adopting climate-smart technologies, transitioning to renewable energy, conserving ecosystems, and developing climate-resilient infrastructure. These actions conserve water resources, reduce GHG emissions, and improve people's living standards.

**Keywords**

Aquatic Ecosystems, Drought, Flooding, Water Quality, Water Quantity